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This report describes an amendment to a simulation program for the training of practicing and prospective educational administrators. The amendment was designed to operationalize and test game theory formats that provide students with feedback on decisions made in the gamed simulations. Game theory instruments used in the amendment are described and their effectiveness is assessed. A related document is ED 018 012. (TT)

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FINAL REPORT

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AMENDMENT TO THE REVISING AND UPDATING THE JEFFERSON TOWNSHIP SIMULATION MATERIALS CONTRACT

The Development and Testing of Gamed Simulations

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U.S. DEPARTMENT OF
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AMENDMENT TO THE REVISING AND UPDATING THE JEFFERSON TOWNSHIP SIMULATION MATERIALS CONTRACT

The Development and Testing of Gamed Simulations

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Robert E. Sweitzer

February 1968

The research reported herein was performed pursuant to an amendment to a contract with the Office of Education, U. S. Department of Health, Educational, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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The activities described in this report would not have been possible without the contribution of many persons. Most significant, of course, was the work of Robert Ohm, University of Oklahoma, who developed two new prototype games; and Robert Sweitzer, the Pennsylvania State University, who developed research instruments and employed them in the gathering of data relating to the prototype materials. It was primarily through their efforts that this project was accomplished.

Among the individuals contributing to the research effort were faculty members at the University of Connecticut -- Samuel Brownell, Malcolm Rogers, Gerald Rowe, Ray Stinchfield, and Herbert Tag. Additional information was obtained from the "workshop group" of Lancaster County Principals through the assistance of Clifford Burket and Norman Sam of Lehigh University and William Counts, the Assistant Superintendent of Lancaster County Schools. Donald Willower of the Pennsylvania State University assisted in gathering data. The development of the coding system for tabulating responses and the actual tabulation of data were performed by Bernard Busovne. The actual development of instruments was done by Elizabeth Sterrett.

Special appreciation is expressed to Mark Shibles, Associate Director of the University Council for Educational Administration and to Ken Harris, UCEA administrative Assistant. They played a major role in assembling this report.

J.A.C.

GENERAL SUMMARY

The objective of the amendment to the Project entitled "The Revising and Updating of the Jefferson Township Simulation Materials" was to operationalize and test game formats of materials based upon concepts set forth by Robert Ohm and Robert Sweitzer in the initial phases of the project. The new products developed in that project, called the Madison simulation materials, use items that have appeared in the in-baskets of administrators. One phase of the revising and updating project was directed at moving beyond the single step, in-basket technique to a more complex and sequenced feedback system.

The amendment to develop game formats for use in the updated Madison Township Simulation Materials proposed two approaches to gaming. Robert Ohm produced two prototype games for the secondary principalship which can provide feedback to students on the decisions made by them in the gaming situation. One game involves a conflict situation between a teacher and a department chairman and the other, conflict between two teachers. A rationale, which is based upon game strategies used in the study of social conflict is provided by Ohm to help users of the Madison materials construct their own feedback items.

Robert Sweitzer conducted a research study which consisted of (1) developing means for obtaining data through five prototype instruments, (2) obtaining data from persons familiar with the Madison simulation materials in three universities, (3) summarizing and analyzing these data, and (4) indicating revisions in the original prototype materials suggested by the analysis. As a result of the research study, Sweitzer suggested revisions in three of the prototype materials developed in the original project.

I. Introduction

This report describes work accomplished in the amendment to the Project entitled "The Revising and Updating of the Jefferson Township Simulation Materials" (U.S. Office of Education Project No. 6-1241). In the "Revising and Updating" Project simulated situations and decision problems were developed for the following administrative positions: the Superintendency, Assistant Superintendency for Business Management, Assistant Superintendency for Instructional Service, the Secondary Principalship, and the Elementary Principalship. The positions simulated were based upon careful studies of real positions in a suburban school district. The suburban district in the original simulation was called Jefferson and in the revision was named Madison. Details of the Madison simulation were reported in December, 1967.[1]

The in-basket technique played an important role in both the "Jefferson" and "Madison" simulations. However, in instructional situations this technique is restricted to a one-shot response format with feedback limited to the post hoc discussion of the set of single responses to an array of items. Therefore, one phase of the "Revising and Updating" project was directed at moving beyond this single step approach. The goal was to create prototypes of a more complex and sequenced feedback system such as those found in the game simulations used in management and military training programs.

The amendment to the project was designed to operationalize game formats of materials based upon concepts set forth by Robert Ohm and Robert Sweitzer in the initial phases of the project. Ohm's rationale, which was derived from gaming theories and strategies used in the study of social conflict, was designed to help users of the materials construct feedback items to responses of the students to initiating in-basket

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[1]Final Report to Bureau of Research, Office of Education, U. S. Department of Health, Education, and Welfare. "Revising and Updating of the Jefferson Township Materials" Project No. 6-1241, Contract No. OEC 3-6-061241-0651.

items used in the training exercise. The simulation was designed to rule out easy answers based on personality weaknesses or strengths. It was assumed that such an approach could illuminate the manipulatory character of administrative reasoning and provide a base for class discussion on what bearing the individual administrator's value system has in relation to his administrative role. Further, the materials are based upon the assumption that dealing with conflict is one of the central tasks of an administrator and that utilization of game theory is a useful method of arriving at conflict decisions based on positive strategies.

As part of the original revising and updating project, Robert E. Sweitzer developed several experimental prototype feedback problems designed for research and instructional purposes. The problems were designed to provide a feedback technique which would enable subjects to become aware of the rationale (including cognitive and affective factors) they employ to define and respond to an in-basket item. In the amended phase of the project, Sweitzer conducted a research study which consisted of (1) developing means of obtaining data through five prototype instruments, (2) obtaining data from persons familiar with the Madison simulation materials in three universities, (3) summarizing and analyzing these data, and (4) indicating the revisions in the original prototype materials suggested by this analysis.

II. Rationale and Procedures

Employing the Ohm rationale drawn from game theory, conflict items within an organizational context are differentiated. A non-game item or situation is one for which a clearly stated rule exists which can be used to resolve the problem. In confronting a conflict situation of this type, the administrator proceeds to search the rule or program-

med decision-making structure of the system at such levels as personnel policies and procedures, school board policies, the state school code, or, if necessary, the rulings of the state attorney general for an existing rule or decision that applies to the situation. When found, the rule must be applied. This search-find-apply process keeps the administrator out of a direct two-person, conflict situation. The training objective for dealing with this non-game class of problems is a knowledge of the rule system and skill in the search process. However, important as this training is, a considerable part of the knowledge and skills involved have a known or defined pattern and can be programmed. Little is required in the way of discretionary, evaluative, or judgmental decision-making; risk-taking; or mediating behaviors considered to be a central aspect of effective performance as a leader in this type of decision-making.

If the in-basket item involves a conflict of interest, no decision rule exists, and a discretionary decision is required. Within the framework of a general rule or policy, the item may be classified as a situation or event to which game models of interaction can be applied. Such situations may have one or more characteristics of games, namely, opposing sets of interests, a set of choices of strategies, interdependence, change, imperfect information, and a preferred ordering of outcomes.

The majority of conflict situations confronted by administrators are of the n-person, non-zero-sum, game type. This administrative conflict situation typically involves the administrator as a third or n-person in the conflict. Several actions may seem equally appropriate. The consequences of one or more alternative actions may not be known or predictable, and the actions that are open that have positive pay-off values may depend on whether the other parties to the conflict are willing to cooperate sufficiently to achieve a positive pay-off solution. The rational treatment for the administrator of the non-zero

sum, conflict of interest in-basket item involving three or more persons is to perceive and maintain a three or n-person game in the face of internal and external pressures toward forming a coalition leading to a two-person game. In addition, administrative strategy for dealing with this situation derives from Schelling's notion of convergence.[2] The moves toward convergence are moves to determine boundaries, i.e., finding the relevant boundaries of a conflict situation or deciding what boundaries are relevant. Boundary refers to the elements that serve to identify or separate one sub-system in connection with a second distinct sub-system. Boundary defining elements may include physical, legal, role, work group relation, or cognitive factors. Determining behavior may refer to the process of ascertaining or fixing the position of, giving a direction to, or to limiting a decision or resolution.

The rationale just described was applied to several sets of in-basket items developed for the new Madison School District Simulation in the amended contract. Of the twenty-plus in-basket items developed in the Madison revision, relatively few could be classified as game events. The majority of the items in the in-basket sets were classified as non-game in form in that all that is required administratively is a search for the appropriate rule and the decision to apply it when found.

Available game in-basket items are almost invariably classifiable as three-person, non-zero sum, conflict-of-interest situations. The first decision point in dealing with such items is to decide whether or not to engage in an information search process. In general, information search moves for this class of events are of three kinds: rule search,

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[2] T. C. Schelling, "The Strategy of Conflict." Journal of Conflict Resolution, Vol. 2, No. 3, p. 248.

conferences, and authority checks. In a simulation exercise, appropriate feedback to the information search moves would indicate that no rule or policy exists, that the two persons in conflict are set on winning (getting administrative support for their position), and that a decision of some sort is necessary.

For this class of events the actual decision made can be categorized as one of four types: (1) no decision; (2) a decision as if a rule or policy exists; (3) a decision to form a coalition with one or the other of the protagonists; or (4) a decision to maintain the situation as a three-person game through some form of mediating or boundary determining behavior. The rational consequence of each type of decision is given in feedback set number one. The decision to make no decision leads to a second complaint. Treating the conflict situation as a non-game event would bring a response confirming that no prior rule existed to cover the situation. Forming a coalition with one or the other of the parties in conflict would bring a more vigorous, negative response from the party excluded from the coalition. Maintaining a three-person game through action to determine the boundaries of the conflict would be rationally expected to lead to a solution of the conflict, to a solution which, desirably, would be perceived as at least a partial win by both parties in conflict.

The viewpoint reflected in Ohm's prototype feedback model differed considerably from the viewpoint and intent of the Sweitzer-developed instruments. Ohm's approach reflects an attempt to improve learning by structuring existing information in such a way that "facts," alternatives," and "probable outcomes" can be more clearly understood. Sweitzer's rationale intentionally emphasized other sets of assumptions about learning. Sweitzer's framework assumes that knowledge can never be completely objective and each person must be helped to develop a pattern of thinking which enables him to make sense of his own situation and his own behavior. The instruments developed by Sweitzer were viewed as

means for helping the subject become more sensitive -- through feedback loops -- to his own thinking.

Sweitzer obtained 140 sets of data through the cooperation of the University of Connecticut, Lehigh University, and The Pennsylvania State University, regarding initial responses to four prototype simulation feedback instruments. The three instruments used to collect data were: (1) an instrument developed by Sweitzer to obtain data concerning the first two steps of the program developed by Ohm based on a game theory derived rationale; (2) an instrument developed by Sweitzer, the RES Decision Problem B-1;[3] and (3) another Sweitzer instrument, the RES Decision Problem B-2 employing a combined programmed and "cartoon" technique. The fourth research instrument was the RES Decision Problem C based on an in-basket item involving a superintendent and the president of a teacher's association, and employing a combined programmed and "cartoon" technique. The fifth research device the the RES Decision Problem A, a simple two-step, face-to-face feedback problem involving an elementary principal and a teacher, and employing a "cartoon" technique.

Codes were developed for tabulating finite structured responses and responses to open-ended questions. The relatively small sample per instrument restricted summarization of data in terms felt to be most pertinent to instrument revision. No statistical comparisons of responses to the same instrument was attempted.

III. Description of Materials Produced and Findings of Research

Ohm's leadership game for the secondary principalship is presented in five separate parts: an instructor's guide; packet one which contains directions and feedback materials

[3] RES indicates that these materials have been developed for research as well as instructional purposes by R. E. Sweitzer.

for a conflict item between a teacher and a department chairman; packet two which contains data and feedback materials for a teacher-teacher conflict item; instructor's discussion guide; and a copy of the game rationale.

The instructor's guide contains suggestions for procedures to be used in working with the game. Guidelines are presented for providing additional feedback information to student questions in general terms consistent with specified restraints applicable to specialized types of questions. A procedure for class use is described in which rules are stated for instructor participation when conditions of student readiness are met. Suggestions are given to aid the instructor in evaluating student responses to the feedback items and for proceeding to the succeeding in-basket item.

Materials designated as student packet one represent a sequence of decisions which trainees could make in regard to the problem presented in the in-basket item. The item sets up a conflict situation between a teacher in the mathematics department and the chairman of the department. The trainee reads a letter from the teacher to the principal in which the conflict becomes clear. After reading the letter, the trainee is directed to go to the next page and indicate the action he would take based on the information provided. After marking his choice of action, the student then turns to the page indicated by the choice of action he selected. The decision sequence is programmed, and it is imperative to the desired outcome of the game that the student follow directions carefully and avoid reading any page except that to which he is directed. Students continue to proceed according to directions determined as a result of their decisions until the game terminates.

Packet two materials are similar in design to those in packet one. In this set of materials a conflict situation involving two teachers is described. The teachers involved are both competent but differ in <u>modus operandi</u>. The procedures for moving through packet

one apply equally to packet two. The response made by a student on one item determines the additional feedback and the steps he will take during the remaining stages of the game.

The instructor's discussion guide contains suggestions for conducting the post-mortem discussion of student responses to the game materials. This phase encompasses the real instructional value of the game format. Suggestions are made concerning the gathering and summary of such data as; (1) content analysis of information moves, number of students choosing each cycle, and the average and range of times information was sought; (2) summary of decision choices made; and (3) summary of types of boundary determining solutions offered by students. The guide suggests ways of leading discussion to show students the value of making decisions on a rational basis rather than on the basis of personality strengths or weaknesses.

The game rationale holds that the theory of games of strategy and the view that dealing with conflict is a central task of administration may be combined to form a rationale for treating conflict situations. The rationale seeks to provide a base for: (1) classifying in-basket items in a way that clarifies the types of actions that can be taken in response to the item, and (2) constructing feedback for the class of items reflecting conflict situations. A flow chart is presented for the treatment of conflict. Differentiation between game and non-game situations is presented as being a preliminary requirement to analysis. This is followed by describing how a game event may be classified into one of four basic types of games. The rationale suggests next steps of field testing and the development of a game rationale for the analysis of information search processes.

Sweitzer's research, employing the four instruments previously mentioned, resulted in data that seemed to suggest the appropriateness of Ohm's suggested application of his rationale to in-basket items such as in the conflict situation between a teacher in the mathematics department and the chairman of the department. A possible weakness is that all

data are in terms of objectified responses (kind of information that would be sought) and does not suggest the meanings that would be attached to this kind of information. Neither is the motivation of the respondent, or the reasons why he would want such information revealed by the responses obtained through this instrument. Such meanings, motivations, or reasons must be inferred by the reader or sought from the respondent by the instructor. However, the information so obtained by the suggested instrument through Decision Set #2 of the Ohm Rationale, seems adequate for deriving information necessary for designing subsequent feedback information items.

The Sweitzer RES Decision Problem B-1 and the RES Decision Problem B-2 developed during initial phases of the project, involve three persons: a high school principal, a teacher, and a department head. The situation might be characterized as a "conflict between two others" in which the administrator can exercise considerable discretion because of the probable absence of any definite regulation or policy covering the conflict of interests, even though some policies may be related to the substantive elements (grading and use of instructional films) of the problem.

The principal is first asked to give his first "solution" response and his reasons for this response. Then he is asked a series of questions concerning the desirability, probability, and risk estimates and is given an opportunity to alter his first "solution" response. He is then asked to suggest two other alternative courses of action and to compare all three with the desirability and probability estimates and to compare the "index" result with his previous two "solution" responses. He is then given another opportunity to change either or both of his previous two decisions.

The small sample (10) used to test the B-1 instrument was insufficient to determine any weaknesses in this instrument. Verbal comments by the participants did suggest the

desirability of eliminating the material beyond page 8 of the original game, and this modification was made in the revised edition of the game. Responses from 14 subjects to the B-2 instrument revealed an increased emphasis upon the interpersonal relationship dimensions of the problem. This observation suggests that the nature of the feedback instrument may have an influence upon analysis and response. The majority of responses to the total instrument were favorable with the most frequent comments applauding the technique as one that helps the respondent "get to know one's assumptions" or that the problem emphasized the need to listen to and consider all aspects of a problem -- expecially the personal dimensions -- to avoid taking any premature action.

The RES Decision Problem A may be characterized as a simple two-step, face-to-face feedback problem of an elementary principal. It requires a minimum knowledge of the elementary school testing program and schedule (with most of the necessary information contained in the problem itself). Although only a dialogue takes place, four persons are directly involved or affected: the principal, a teacher, a parent, a student. The program permits a discussion of (1) the relationship between the first response and its stated reason, (2) the change or no change between two sequential responses, (3) the relationship between the second response and its stated reason, and (4) the change or no change between two sets of reasons regarding two sequential responses.

This instrument may be regarded as having unlimited possibilities for "incident treatment" instruction. The ease with which the instrument can be developed, the short time of administration, and the enthusiasm of participants generated as a result of the administration all tend to lead into a lively discussion. As a result of the research, the options for the second decision step were revised to provide one less possible response by the principal to the teacher.

The RES Decision Problem C is designed to have the subject's responses to several programmed alternatives serve as in-basket items for other persons for whom in-basket sets have been prepared. In addition, it demonstrates how the response of these other persons can be used as actual feedback "in" items to the subject that can be compared with his probability estimates of their responses. The situation involves two major characters: Robert O. Sydney, Superintendent (whose role the subject is to carry out) and Lawrence C. Bennett, teacher and President of Madison Teacher's Association. Also involved, but, indirectly, are the Assistant Superintendent for Instructional Service, Assistant Superintendent for Business Management, principals and assistant principals, and department and grade level chairmen.

This instrument was the most complex of the five instruments used to obtain data for the present investigation, took the longest time for subjects to complete (about 45 minutes average for the steady workers), and received the largest number of complaints because of its complexity. Many subjects omitted answering some questions completely or skipped steps inthe sequence of questions. There was no adverse criticism of the request to write a memo to the Assistant Superintendent for Instructional Services, to the Assistant Superintendent for Business Management, and to all Principals. For these reasons the RES Decision Problem C has been revised by discarding pages 10 to 15 of the original game, but retaining the forms for writing the three requested memos.

Perhaps the most important finding of the Sweitzer research study concerns the observation that persons respond to in-basket items, and to these semi-programmed feedback prototype instruments, more in terms of a general pattern of behavior or decision-making than upon the information pertinent to the problem and made available in the background materials. Although no statistical comparison was made, there was no observable

difference in the responses of the participants in this study who were familiar with the Madison simulation materials and the responses of those unfamiliar with the materials -- or even with public school administration. This phenomenon may also partially explain the relationship between in-basket responses and on-the-job behavior; subjects ignore the background materials and act "typically."

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ABSTRACT

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